BASE Buildings Test Space HVAC Characteristics: System-Type Breakdown of Central Air Handling and Distribution Systems

Breakdown of Central Air Handling and Distribution System Types	Number of Test Space Air Handlers
SINGLE DUCT	
Single Duct, Constant Volume, Single Zone	13
Single Duct, Constant Volume, Multiple Zone Reheat	8
Single Duct, Constant Volume, Multiple Zone Bypass	0
Single Duct, Variable Air Volume	37
Single Duct, Variable Air Volume, Reheat	17
Single Duct, Variable Air Volume, Induction	7
Single Duct, Variable Air Volume, Fan Powered, Constant Fan	8
Single Duct, Variable Air Volume, Fan Powered, Intermittent Fan	18
Single Duct, Variable Air Volume, Dual Conduit	0
DUAL DUCT	
Dual Duct, Constant Volume	2
Dual Duct, Constant Volume, Reheat	7
Dual Duct, Variable Volume, Single Fan	3
Dual Duct, Variable Volume, Dual Fan	1
OTHER	
Multizone, Constant Volume	17
Constant Volume, Blow Through Bypass	3
Texas Multizone, or Three Deck Multizone	0
Total Number of Test Space Air Handlers	141

Variable Descriptions:

Breakdown of Central Air Handling and Distribution System Types describes the type of air handling unit configuration for air handling units serving the BASE test spaces. The following categories apply:

Single Duct, Constant Volume, Single Zone The air handler supplies a constant volume of supply air to a single zone with minimum heating and cooling load variations. The load within the space is controlled by varying the temperature of the supply air. The supply air temperature is controlled by varying the quantity and/or temperature of the heating or cooling source, by varying the relative proportions of outdoor air intake and recirculation, by modulating the position of face and bypass dampers within the air handler, or a combination of these approaches.

Single Duct, Constant Volume, Multiple Zone Reheat The air handler supplies a constant volume of supply air to multiple zones with unequal loads. The load within each zone is controlled by varying the temperature of the supply air delivered to the zone. The supply air temperature is controlled by varying the amount of heating or cooling at the air handler, the relative proportions of outdoor air intake and recirculation, the position of face and bypass dampers within the air handler, or a combination of these approaches. Further temperature control is provided by reheat coils in the ducts in each individual zone.

Single Duct, Constant Volume, Multiple Zone Bypass The air handler supplies a constant volume of supply air to multiple zones with unequal loads. The load within each zone is controlled by varying the temperature of the supply air delivered to the zone and the amount of supply air that is actually delivered to the zone. The supply air temperature can be controlled by varying the amount of heating or cooling at the air handler, the relative proportions of outdoor air intake and recirculation, the position of face and bypass dampers within the air handler, or a combination of these approaches. Further temperature control in individual zones is provided through the use of a bypass box in the zone which dumps some of the supply air into the return air plenum or duct.

Single Duct, Variable Air Volume The air handler supplies air at a constant temperature of approximately 10°C (50°F) through a duct system to VAV units located in the ceiling plenum. In each zone, the VAV units control the quantity of supply air delivered to each zone to meet the cooling load requirements within the zone. The total quantity of supply air delivered by the air handler therefore varies in response to variations in the space load within the building. A true VAV system provides cooling only, with perimeter zones heated by some other system.

Single Duct, Variable Air Volume, Reheat This system is a modification of a true VAV system capable of providing both heating and cooling. Heat is provided in or near the terminal units after the supply airflow rate has been reduced to a predetermined minimum.

Single Duct, Variable Air Volume, Induction A VAV air handler provides primary air to unpowered terminal units that induce plenum or room air into the supply airstream. The combination of primary and induced air provide a constant airflow. Variations in space load are met by varying the relative proportions of the primary and induced air. Reheat coils or some other form of auxiliary heat are required when heat gain in the room and ceiling can not balance transmission losses and cooling loads associated with the primary supply air.

Single Duct, Variable Air Volume, Fan Powered, Constant Fan A VAV air handler supplies primary air to fan powered induction units that are installed in series with the primary supply airflow. The fan powered units run continuously and operate at a relatively constant volume. In each zone, the unit mixes the required quantity of primary supply air with induced return air from the plenum. Terminal units in exterior zones have heating coils for winter heating requirements. The heating coil is not activated until the primary air volume is reduced to a minimum.

Single Duct, Variable Air Volume, Fan Powered, Intermittent Fan A VAV air handler supplies primary air to fan powered induction units that are installed in parallel with the primary supply airflow. The unit modulates the primary supply air in response to the cooling needs of the zone and operates the fan powered unit when induced air is needed to meet the heating requirements. The primary air and the induced air mix within a common plenum within the fan powered unit.

Single Duct, Variable Air Volume, Dual Conduit This system has two airstreams, a primary system used to offset transmission losses and a secondary system to meet year round cooling loads. The primary system operates at a constant volume and conditions return air from the ceiling plenum. This system cools the air in the summer and heats it in the winter to meet transmission losses and sometimes operates only during peak conditions. The secondary system is a conventional VAV system that provides year round cooling to meet space cooling loads.

Variable Descriptions: (continued)

Dual Duct, Constant Volume The air handler supplies a constant volume of supply air to multiple zones, with the supply fan blowing through cooling and heating coil sections connected to cold and hot ducts respectively. These two ducts run through the building to mixing boxes (unpowered) in the ceiling plenum, which mix the warm and cold air in proper proportions to meet the loads in the zone. The dampers in the mixing boxes are controlled by zone thermostats.

Dual Duct, Constant Volume, Reheat The air handler supplies a constant volume of supply air to multiple zones, with the supply airstream being split into two flows, one blowing through cooling coils and the other blowing through heating coils. The hot and cold air ducts run through the building to mixing boxes (unpowered) in the ceiling plenum, which mix the hot and cold air in proper proportions to meet the loads in the zone. The dampers in the mixing boxes are controlled by zone thermostats. Interior zones mixing boxes may only be connected to the cold deck.

Dual Duct, Variable Air Volume, Single Fan A single VAV air handler supplies air to multiple zones, with the supply fan blowing through cooling and heating coil sections connected to cold and hot ducts respectively. These two ducts run through the building to VAV mixing boxes in the ceiling plenum, which mix the hot and cold air to meet the loads in the zone. The dampers in the mixing boxes are controlled by zone thermostats. Interior zone boxes may be connected to only the cold duct, while exterior zones will be connected to both the hot and cold ducts.

Dual Duct, Variable Air Volume, Dual Fan In this system, separate supply fans serve the cold and hot decks. The two ducts run through the building to VAV mixing boxes in the ceiling plenum, which mix the hot and cold air to meet the loads in the zone. The dampers in the mixing boxes are controlled by zone thermostats. Interior zone boxes may be connected to only the cold duct, while exterior zones will be connected to both the hot and cold ducts.

Multizone, Constant Volume The air handler supplies a constant volume of supply air to multiple zones, with the supply fan blowing through a cooling coil, a heating coil, or both coils. The space load of each zone is met through a mixture of the hot and cold airstreams that is carried by single duct to the zone. The mixing of the hot and cold airstreams for each zone takes place at the unit, employing dampers in the heating and cooling ducts. The total air quantity to each zone is more or less constant depending on the pressure drop through each coil and the position of the mixing dampers.

Constant Volume, Blow Through Bypass The air handler supplies a constant volume of supply air to multiple zones, with the supply fan blowing air through the cooling coil section or through a bypass section around the cooling coil. The two supply air ducts, cold and bypass, each split off such that there is a cold duct and bypass air duct for each zone. These two supply airflows are brought together within the mechanical room, with a damper in the bypass air duct and a heating coil downstream of where the two flows merge. A constant quantity of air is supplied to each zone through this single duct, and the supply air temperature to each zone is varied as required to meet cooling or heating requirements by modulating the bypass damper and the use of the heating coil. The heating coil is activated only when all of the zone's supply air is bypass air.

Texas Multizone, or Three Deck Multizone The air handler supplies a constant volume of supply air to multiple zones, with the supply fan blowing through a cooling coil or a bypass section. The space load of each zone is met through a mixture of the neutral and cold airstreams that is carried by single duct to the zone. An individual heating coil is located in the duct of each perimeter zone. The mixing of the neutral and cold airstreams for each zone takes place at the unit, employing dampers in the two decks. The heating coils are activated only if the bypass air can not meet the loads. The total air quantity to each zone is more or less constant depending on the pressure drop through each coil and the position of the mixing dampers.